




# Test Monitoring Center

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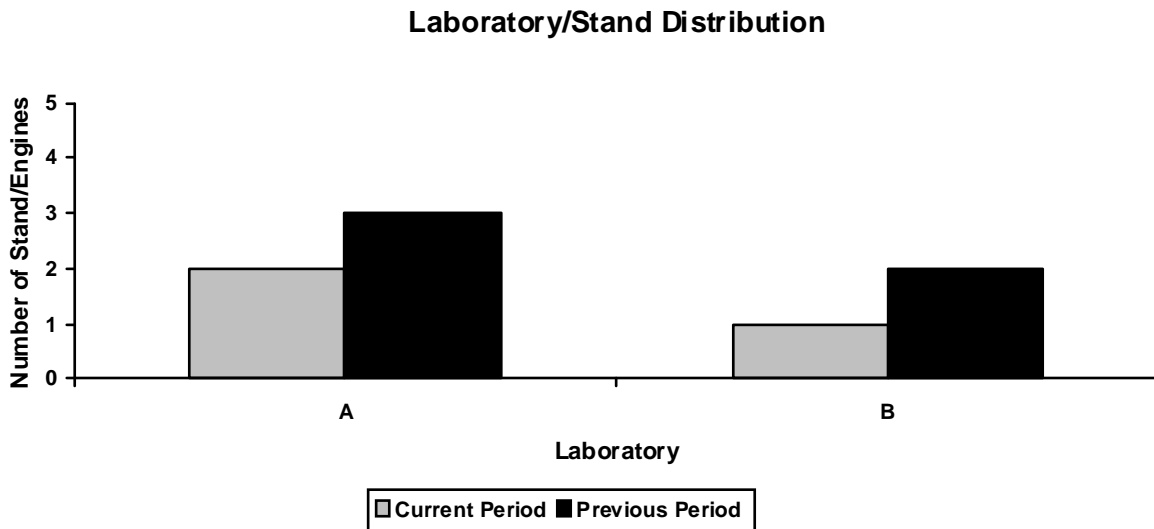
Memorandum: 10-040  
 Date: October 18, 2010  
 To: Fred Gerhart, Chairman, Sequence VIII Surveillance Panel  
 From: Richard E. Grundza   
 Subject: Sequence VIII Semiannual Report: April 1, 2010 to September 30, 2010

The following is a summary of Sequence VIII reference oil tests that were reported to the Test Monitoring Center during the period from April 1, 2010 to September 30, 2010.

### Lab/Stand Distribution

|                                      | Reporting Data | Calibrated as of<br>September 30, 2010 |
|--------------------------------------|----------------|--|
| Number of Laboratories:              | 2              | 2                                      |
| Number of Stand/Engine Combinations: | 3              | 3                                      |

The following chart shows the laboratory/stand distribution:

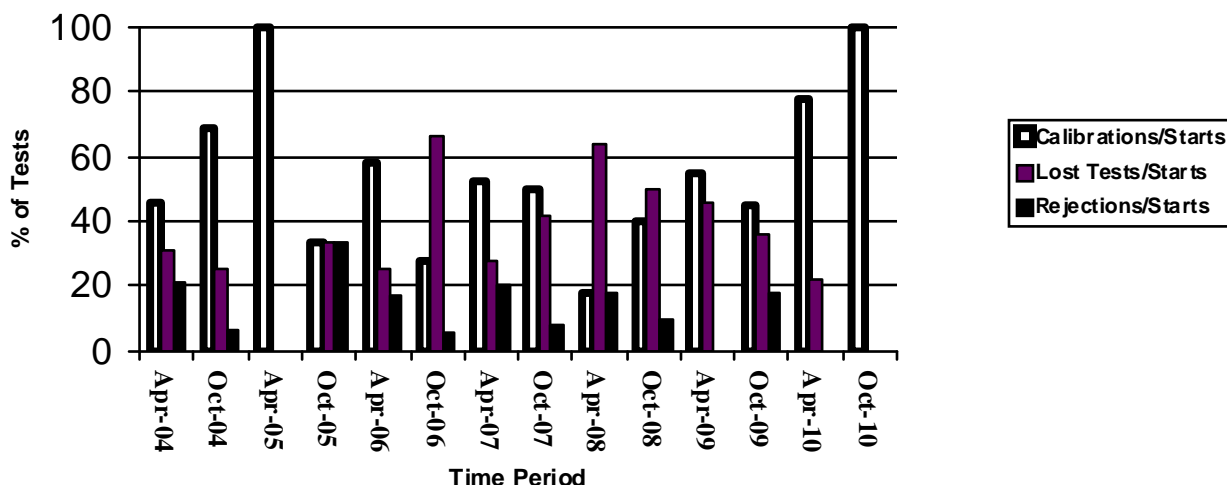


The following summarizes the status of the reference oil tests reported to the TMC:

| Calibration Start Outcomes                 | TMC Validity Code | No. of Tests |
|--|-------------------|--------------|
| Operationally and statistically acceptable | AC                | 3            |
| Total                                      |                   | 3            |

Calibrations per start, lost tests per start and rejection rates are summarized below:

**Calibration Attempt Summary**



There were no failing nor lost tests this report period.

There were no LTMS Deviations this period. There have been three deviations from the LTMS to date.

No lab visits were conducted by the TMC this period.

Information Letters

One information letter was issued this period. Information Letter 10-1 was issued 5-20-2010. This information letter added oil temperature control limits for 0W grade oils (see Figure 7).

Severity and Precision Analysis

Below is a summary of the average  $\Delta/s$ , pooled standard deviation, and average  $\Delta$  in reported units for the tests reported during this period. Also below is a summary of the average  $\Delta/s$  values for all laboratories reporting data during this period.

| <b>Industry Severity Summary</b> |                                      |   |   |
|----------------------------------|--------------------------------------|---|---|
| <b>Parameter</b>                 | <b>Average <math>\Delta/s</math></b> | <b>Pooled standard deviation<br/>(degrees of freedom)</b> | <b>Average <math>\Delta</math>,<br/>in reported units</b> |
| BWL                              | -0.153                               | 2.33 (df=2)   | -0.34 mg  |
| SVIS                             | 0.100                                | 0.120 (df=2)  | 0.01 cSt  |

| <b>Average <math>\Delta/s</math> by Laboratory</b> |            |             |
|--|------------|-------------|
| <b>Lab</b>   | <b>BWL</b> | <b>SVIS</b> |
| A  | 0.231      | 0.864       |
| B  | -0.922     | -1.429      |

### **Bearing Weight Loss (BWL)**

The industry control charts for severity began the period in severity warning and ended the period in control. Precision charts were in control for the period (see Figure 1).

The Industry BWL mean  $\Delta/s$  is -0.153 mild for this report period (see Figure 3). This equates to a shift of -0.34 mg in reported units. The pooled standard deviation for the period is 2.33 mg (see Figure 4), which has improved with respect to the previous period and compares well with historical estimates.

### **Stripped Viscosity (SVIS)**

The industry control chart for severity began the period in mild warning alarm, but ended the period in control. Precision was in control for the period (see Figure 2).

The Industry SVIS mean  $\Delta/s$  is 0.100 mild for this report period (see Figure 5), and equates to a shift of 0.01 cSt in reported units. The pooled standard deviation for the period is 0.12 cSt (see Figure 6), which has degraded slightly with respect to the previous period and is comparable to historical performance.

### Hardware

01-09 bearings were run exclusively for calibration test this period.

### TMC Memoranda

No TMC Memoranda were generated this report period.

Reference Oils

| Oil    | TMC Inventory,<br>In gallons | TMC Inventory,<br>In tests | Laboratory Inventory,<br>in tests | Estimated Life        |
|--------|------------------------------|----------------------------|-----------------------------------|-----------------------|
| 704-1  | 238                          | 119                        | 4                                 | 5+ years              |
| 1006   | 41                           | 20                         | 1                                 | 3 months <sup>1</sup> |
| 1006-2 | 3963                         | 1981                       | 4                                 | 3+ years <sup>1</sup> |
| 1009   | 533                          | 255                        | 3                                 | 3+ years <sup>1</sup> |

<sup>1</sup> Multiple test area reference oil; total TMC inventory shown

REG/reg

Attachments

c: J. A. Clark, TMC  
Sequence VIII Surveillance Panel  
<ftp://ftp.astmtmc.cmu.edu/docs/gas/sequenceviii/semiannualreports/VIII-10-2010.pdf>

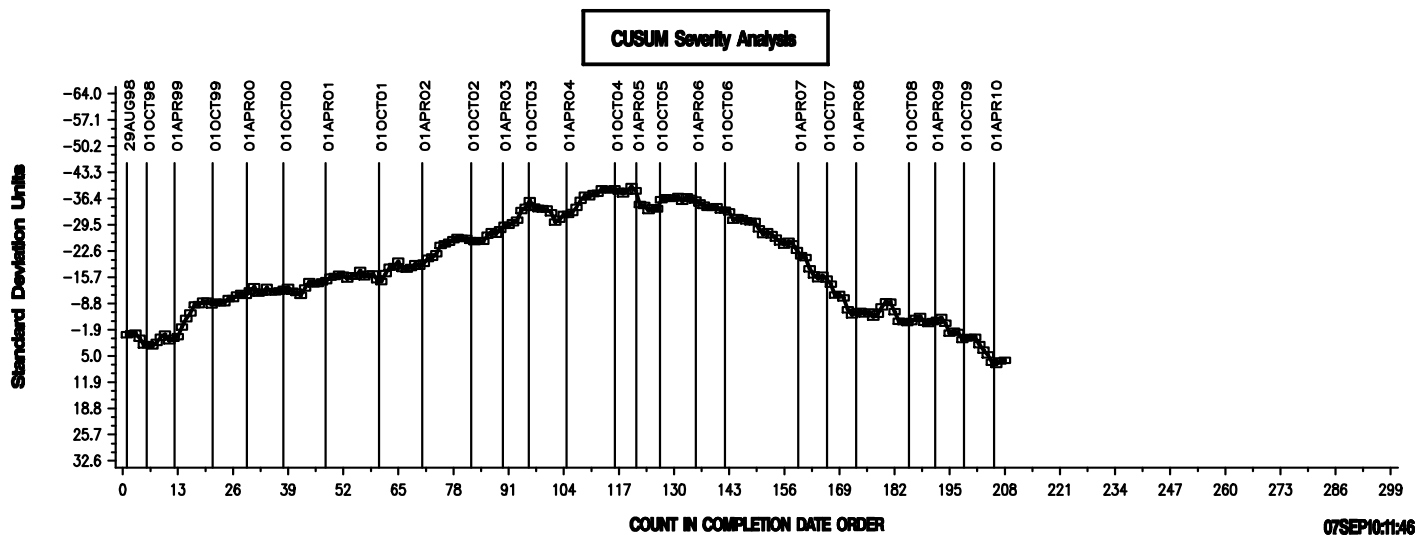
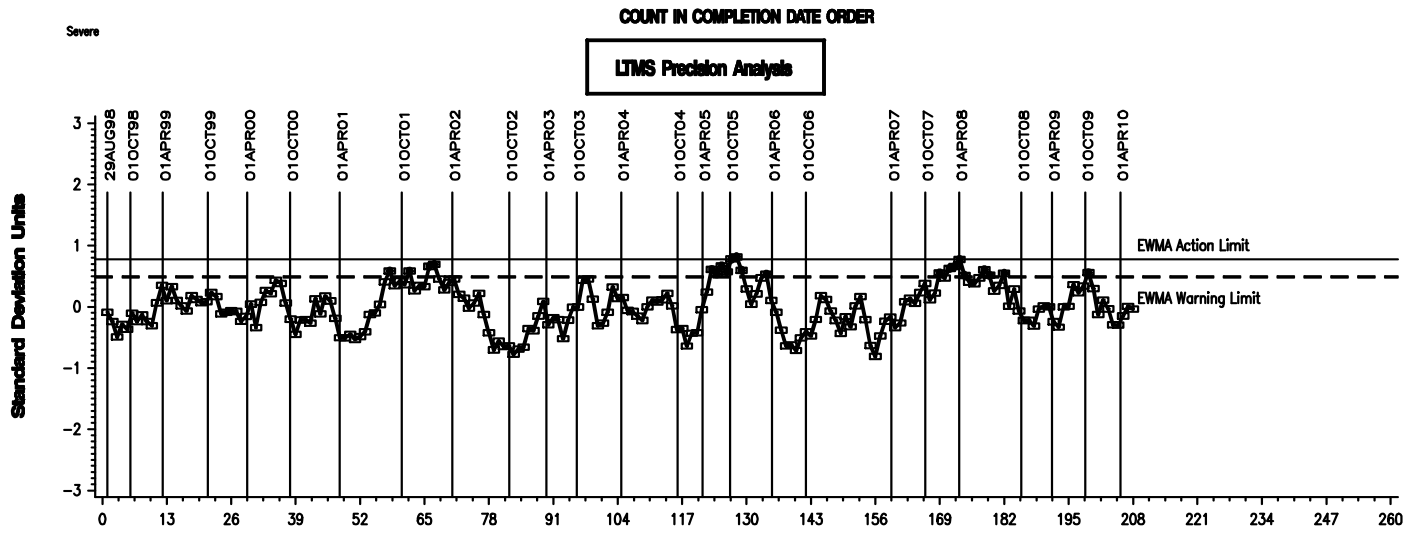
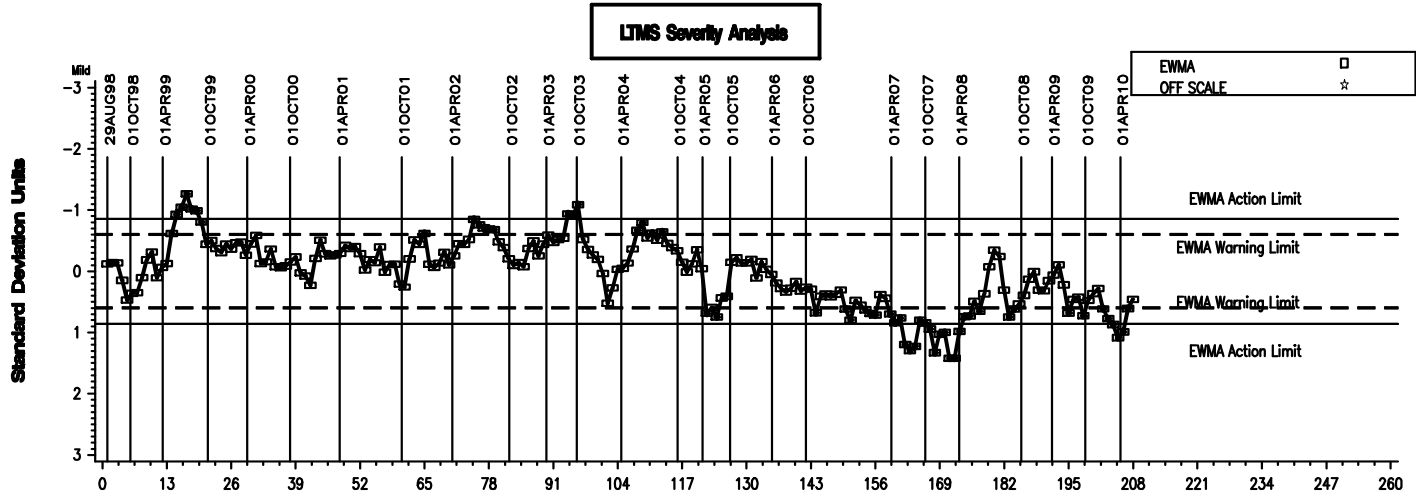
Distribution: Electronic Mail

List of Figures

- Figure 1 graphically presents the Industry control charts for BWL and also the CUSUM delta/s plot (by count in completion date order) of bearing weight loss for operationally valid tests.
- Figure 2 graphically presents the Industry control charts for SVIS and also the CUSUM delta/s plot (by count in completion date order) of bearing weight loss for operationally valid tests.
- Figure 3 graphically presents a historic perspective for BWL mean delta/s by report period.
- Figure 4 graphically presents a historic perspective for BWL pooled standard deviations by report period.
- Figure 5 graphically presents a historic perspective for SVIS mean delta/s by report period.
- Figure 6 graphically presents a historic perspective for SVIS pooled standard deviations by report period.
- Figure 7 is the Sequence VIII Timeline, created to track changes in test hardware and operations.

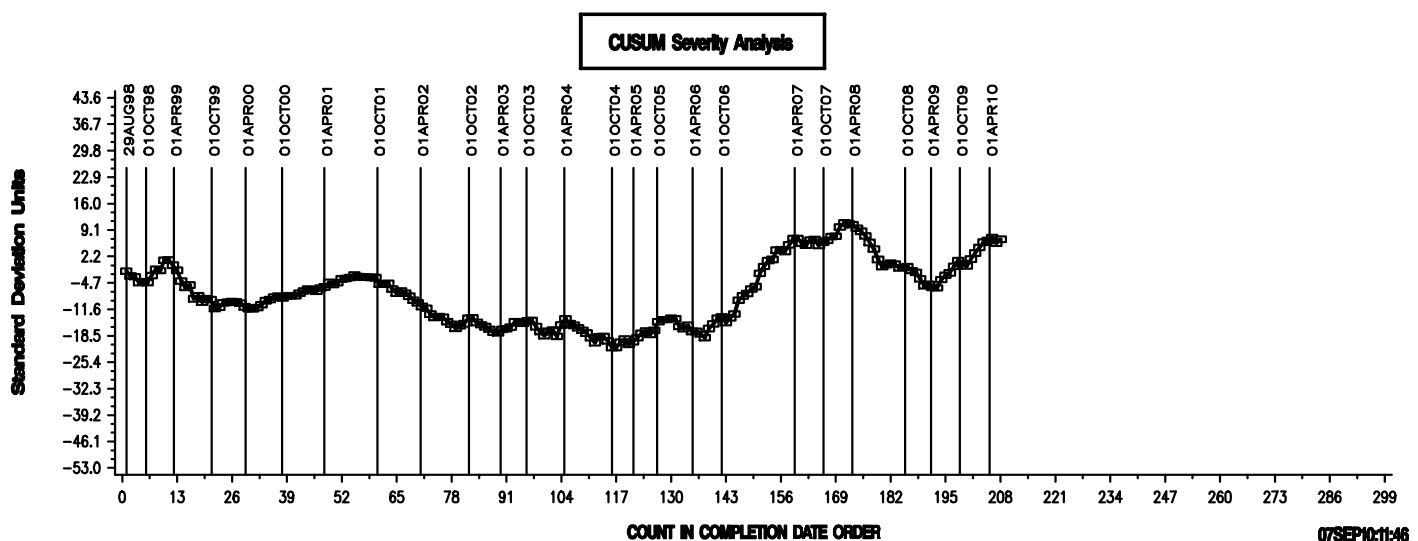
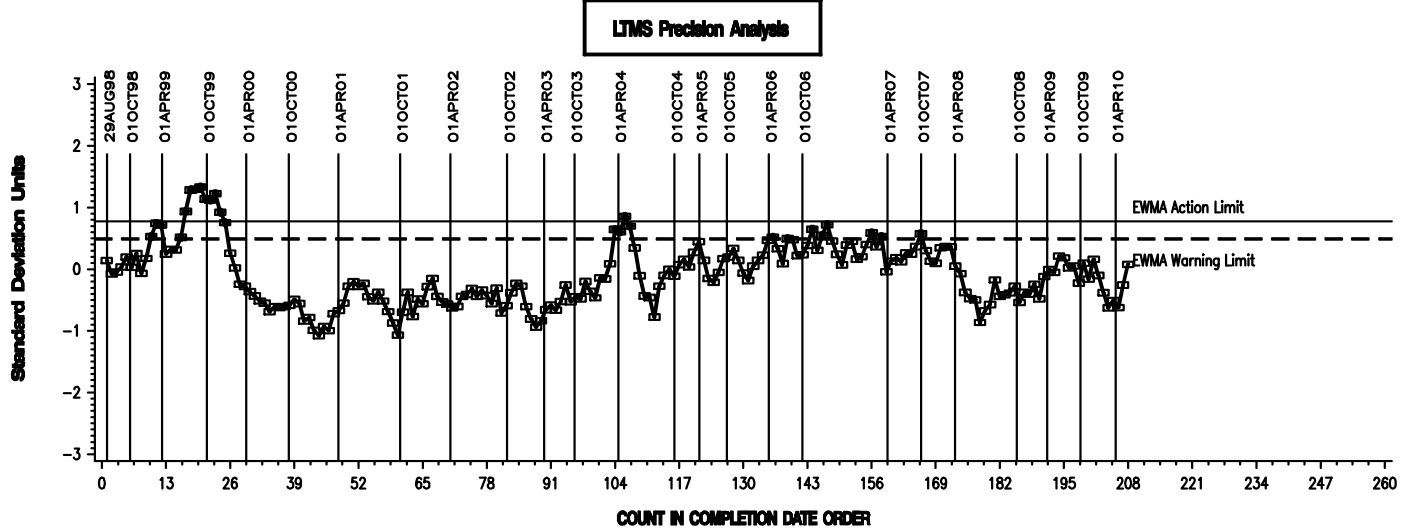
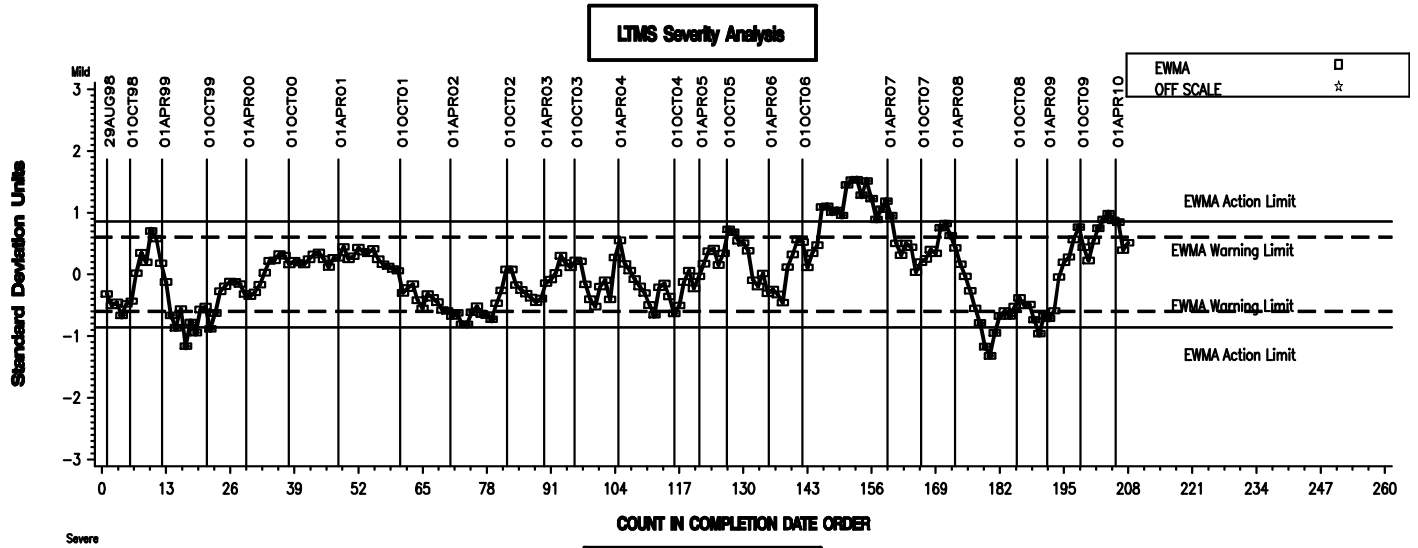
**Figure 1**  
**SEQUENCE VIII INDUSTRY OPERATIONALLY VALID DATA**

**FINAL BEARING WEIGHT LOSS**

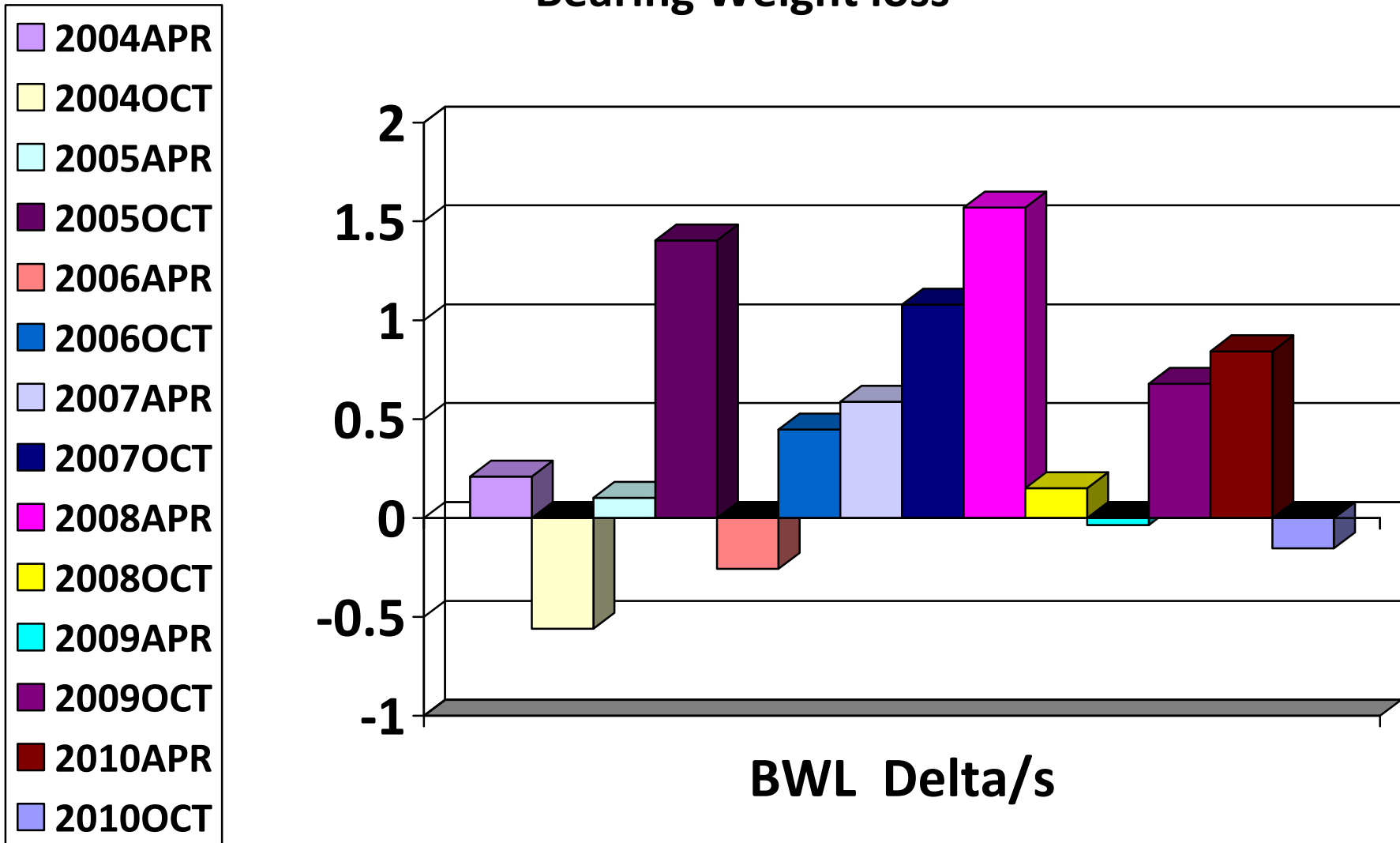


**Figure 2**  
**SEQUENCE VIII INDUSTRY OPERATIONALLY VALID DATA**

STRIPPED VIS. @ 100 DEG C

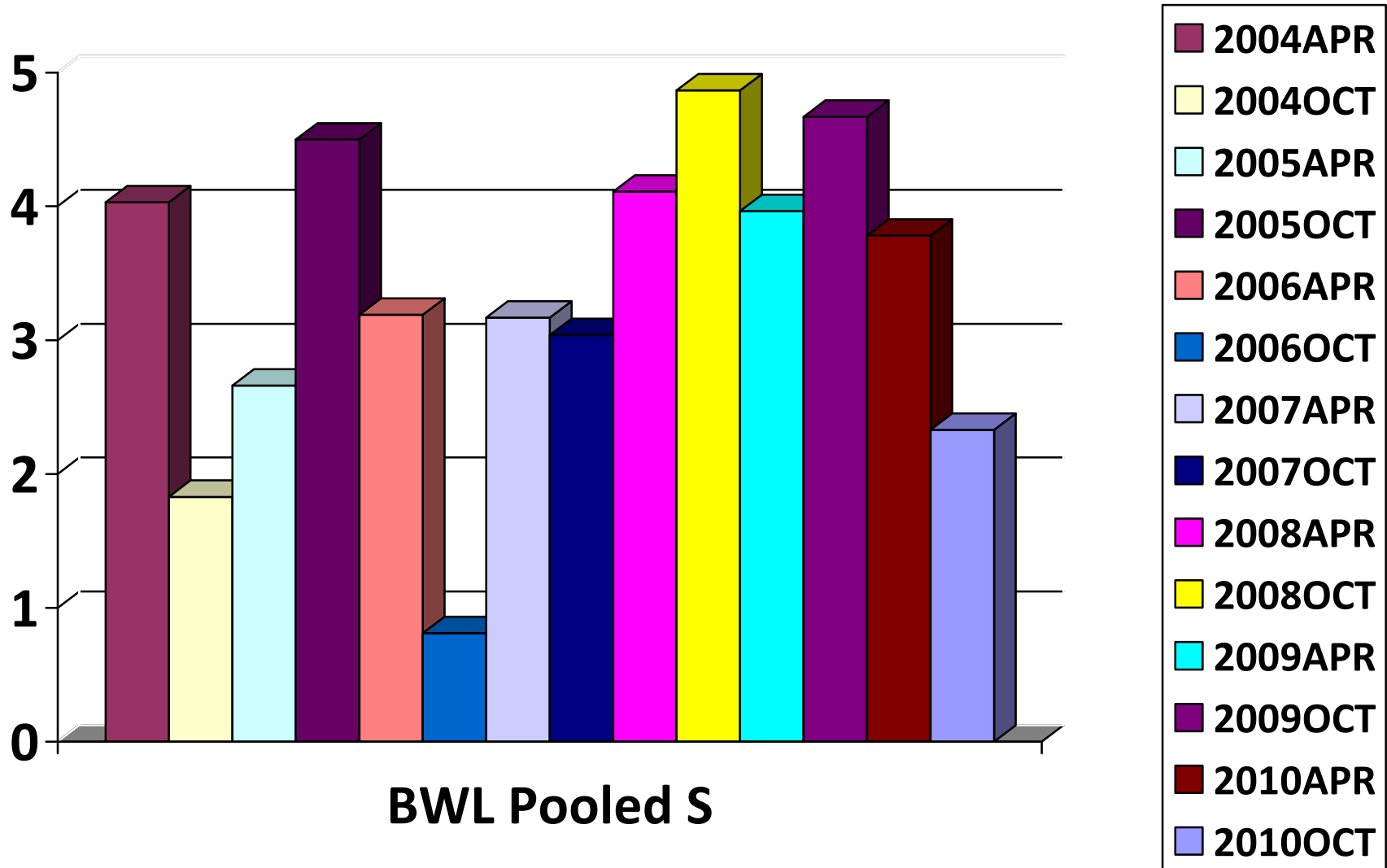


**Figure 3 - Sequence VIII Reference Oil Data  
Bearing Weight loss**

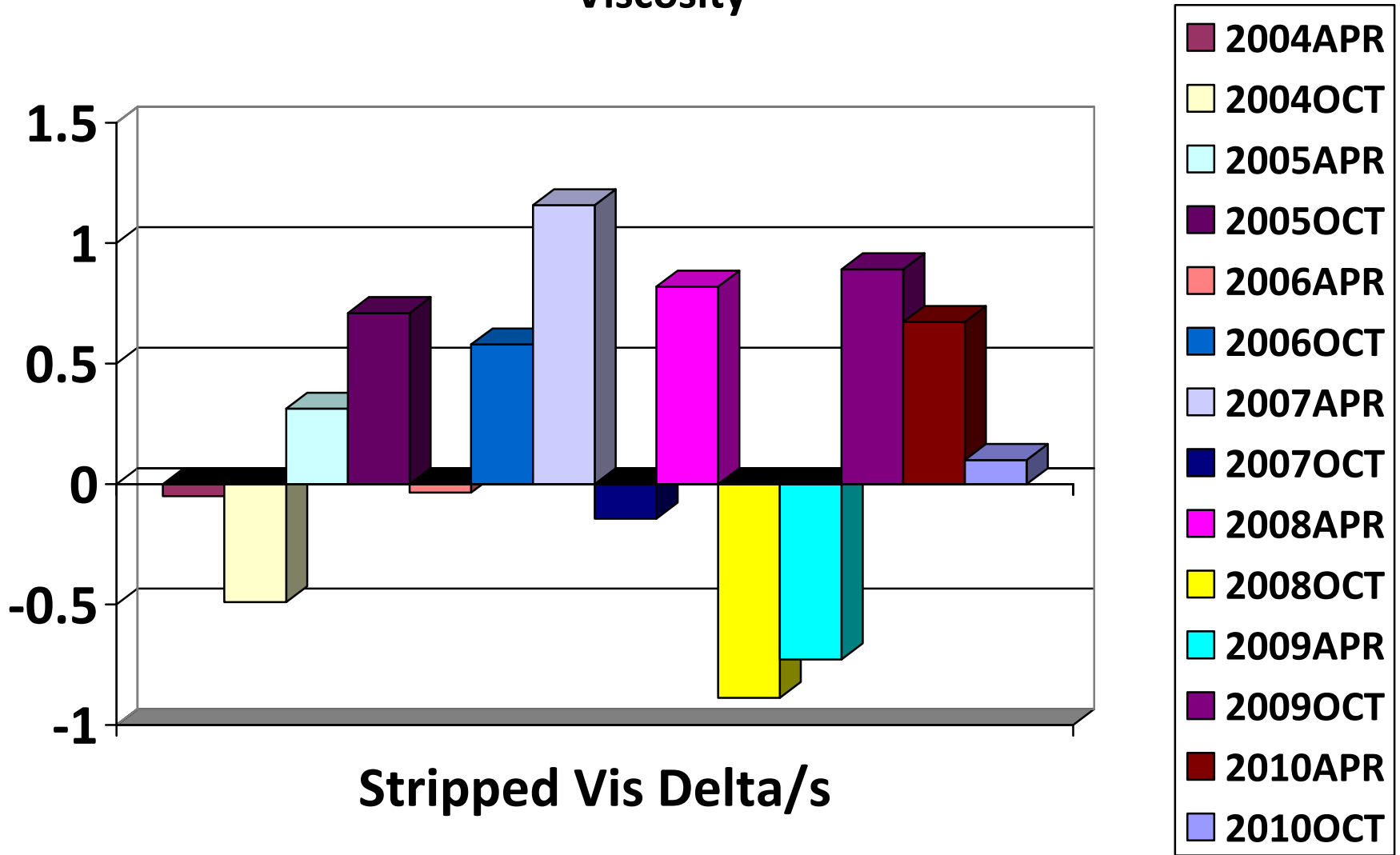




**Figure 4 Sequence VIII Reference Oil Data Bearing Weight Loss**



**Figure 5 - Sequence VIII Reference Oil Data Stripped  
Viscosity**



**Figure 6 - Sequence VIII Reference Oil Data Stripped  
Viscosity**

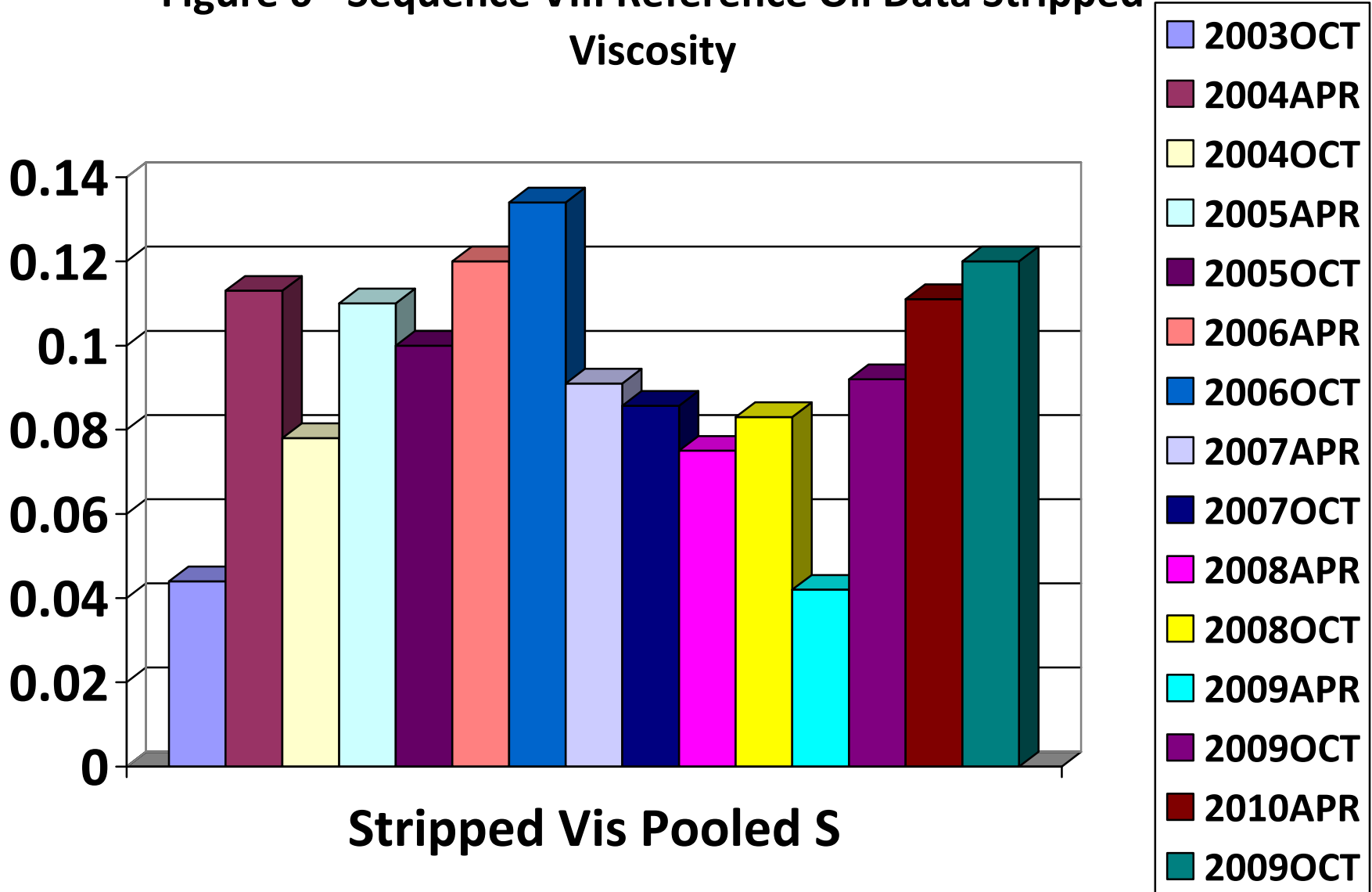


Figure 7 - Sequence VIII Timeline

| Date       | Topic  | Information Letter |
|------------|--|--------------------|
| 2/10/1999  | NEW PISTON RING BATCH APPROVED FOR USE IN SEQUENCE VIII TESTING                          | 00-1               |
| 4/16/1999  | DRAFT 3.1 OF THE SEQUENCE VIII TEST PROCEDURE ISSUED                                     | 99-1               |
| 5/19/1999  | REMOVAL OF RING BATCH REPORTING REQUIREMENTS   | 00-1               |
| 5/19/1999  | NEW OIL FILTER (RAYCOR LFS-62) IMPLEMENTED INTO TESTING                                  | 00-1               |
| 11/16/1999 | TEST ENGINEERING INC. NEW TEST PARTS SUPPLIER  | 00-1               |
| 1/28/2000  | PISTON CLEANING PROCEDURE FOR REUSING PISTONS IN SEQUENCE VIII TESTING                   | 00-1               |
| 6/15/2002  | REVISED STAY-IN-GRADE PROCEDURE IMPLEMENTED  | 02-1               |
| 11/18/2002 | EDITORIAL REVISIONS TO D6709-01  | 02-2               |
| 1/1/2004   | NEWINERAL SPIRITS SPECIFICATION  | 03-1               |
| 1/26/04    | BILLET CRANKSHAFT APPROVED FOR USE IN SEQUENCE VIII TESTING                              |                    |
| 12/9/2004  | CLARIFIED SOLVENT SPECIFICATION  | 04-1               |
| 12/9/2004  | REVISED FUEL FLOW SPECIFICATION  | 04-1               |
| 12/9/2004  | REQUIREMENTS FOR BUILDS WITH OVERSIZE PISTONS  | 04-1               |
| 6/23/05    | DELETED ROCKER COVER INLET TEMPERATURE AND PRESSURE SENSORS, UPDATED PRECISION STATEMENT | 05-1               |
| 9/20/06    | FIRST TEST ON 03-06 BEARINGS   |                    |
| 10/24/06   | REVISED BEARING CLEANING PROCEDURE IN ANNEX A9   | 06-1               |
| 3/12/07    | TARGET UPDATE, REFERENCE OIL 1006-2  |                    |
| 5/15/08    | ADDED RESERVIOR TO ROCKER COVER INLET  | 08-1               |
| 6/12/08    | CLARIFIED HARDWARE REUSE GUIDELINES  | 08-2               |
| 5/28/09    | DELETED REQUIREMENT TO SEND HARD COPY REPORT TO TMC                                      | 09-1               |
| 5/28/09    | ADDED REQUIREMENT TO REPORT ALL RESULTS FROM REFERNCE OIL TESTS TO TMC                   | 09-1               |
| 11/18/09   | ADDED RACOR HOUSING LFS-55 TO TEST METHOD  | 09-2               |
| 05/20/10   | ADDED 0W OIL TO TEMPERATURE SPECIFICATION  | 10-1               |